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DRAFT FINAL REPORT

RADIACTIVE TRANSFER MODELS FOR SATURN AND TITAN

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In this period of performance January 20, 1995 - September 29, 1996 , a graduate student worked with Dr. Mein Abbas at the NASA/MSFC computer facilities to accomplished the task set forth in the statement of work.

The infrared spectra of the earth's atmosphere and planetary atmospheres contains information about atmospheric physical and chemical processes. Atmospheric molecular constituents absorb and emit infrared radiation by rotational and vibrational transition. Observed spectra exhibit characteristic features in the electromagentic spectrum region. Observation of the absorption or thermal emission spectra may be obtained with space-borne high resolution infrared spectrometers in the 10-5000 cm^{-1} (2-1000 μm) spectral region. Information about the atmospheric thermal structure, composition, and the chemical and physical processes of the observed spectral was accomplished. A preliminary version of a P-T retrieval algorithm for Saturn using all three modes for temperature inversion, e.g., CH4-limb, and H2-nadir spectra was completed and tested for accuracy.

Radiative transfer and inversion programs were studied and analyzed for applications to infrared limb thermal emission observations of Saturn and Titan from the Cassini Orbiter, as well as Earth's atmosphere. Analysis and modification of the existing radiative transfer and inversion programs for Earth and planetary atmospheres are being made. Data analysis and retrieval of information form the observations by digital calculations were carried out at UAH and MSFC computer. The working program for generating and reading g-k arrays for using the c-k arrays via the c-k method for radiative transfer calculations for desired atmospheric and instrumental parameters was completed, tested for accuracy and resides at the MSFC computer.